3/9/13

(5)

**BE (Regular) Degree End Semester Examinations, Nov/Dec 2013**
**II Semester**
**EC9152 Circuit Analysis**
**Reg-2009**

Total Marks:100

**PART-A (10 X 2 =20 Marks)**

1) In a circuit 5μJ of energy is required to transfer 0.1μC from point A to point B. Determine the electric potential difference that exists between the two points.
2) For the circuit in Figure-1, if $v_2=1000i_2$ and $i_2=5mA$, determine vs.
3) Define super-position theorem.
4) Draw the dual of the circuit shown in Figure-2.
5) Find the angle by which $i_1$ lags $v_1$ if $v_1=120\cos(120\pi t-40^o)$ and $i_1=-0.8\cos(120\pi t-110^o)$.
6) Find the average power being delivered to an impedance $Z_L=8-j11\Omega$ by a current $I=5\angle 20^o$.
7) At $\omega=1000$ rad/sec, Find a parallel network that is equivalent to series network shown in Figure-3.
8) The Circuit shown in Figure-4 has been in the form shown for very long time. The switch opens at t=0. Find $i_R$ at t equals to $\infty$.
9) A 480/2400 Vrms step-up ideal transformer delivers 50KW to a resistive load. Calculate the turns ratio.
10) Two coils with inductances in the ratio of four to one have a coupling coefficient k=0.6. When these coils are connected in series aiding, the equivalent inductance is 44.4mH. Find $L_1$, $L_2$ and M.

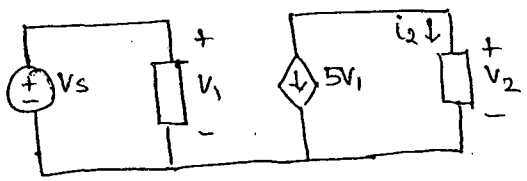


Figure-1

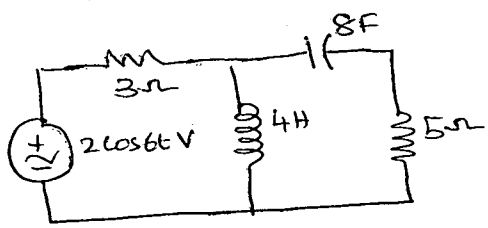


Figure-2

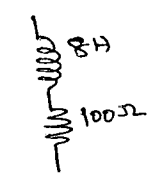


Figure-3

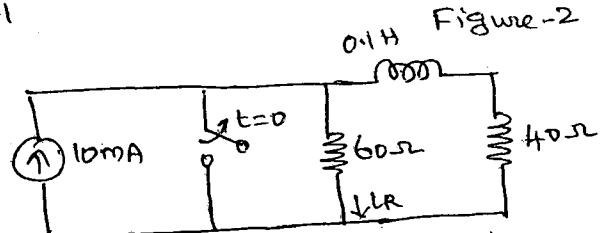


Figure-4

**PART-B (5 X 16 =80 Marks)**

11))i) For the circuit of Figure-5, find the currents $i_1(t)$, $i_2(t)$ and $i_3(t)$ if f=50Hz. (8)
ii) Find the value of vx and vy in the circuit of Figure-6. (8)

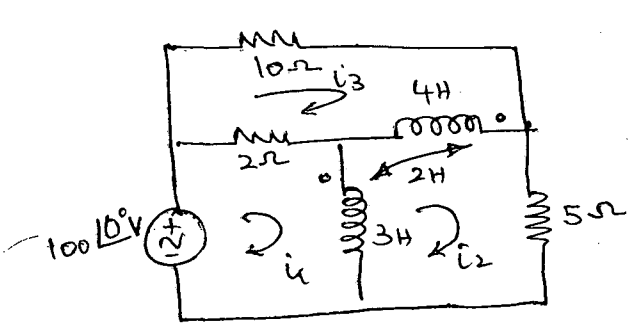


Figure-5

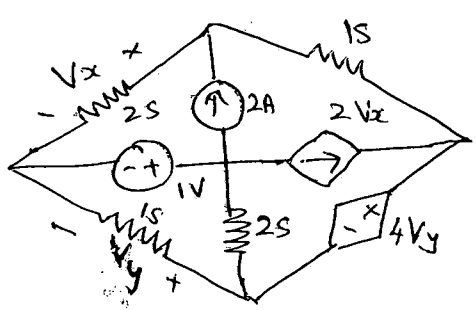


Figure-6

12)a)i) Find $V_1$ in the circuit of Figure-7 using source transformation. (6)

ii) Determine the Thevenin and Norton equivalents of the network shown in Figure-8. (10)

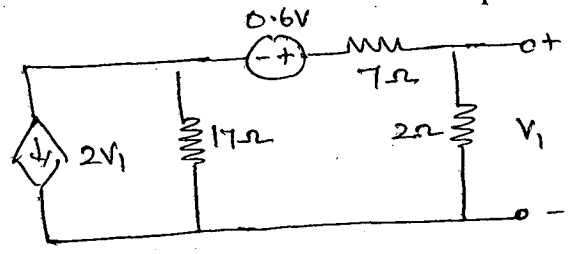



Figure-7

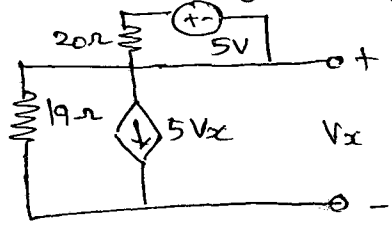



Figure-8

**(OR)**

b)i) The circuit shown in Figure-9 depicts a circuit separated into two stages. Select $R_1$, so that maximum power is transferred from stage 1 to stage 2. (8)

ii) Replace the network in Figure-10 with an equivalent three-△ network. (8)

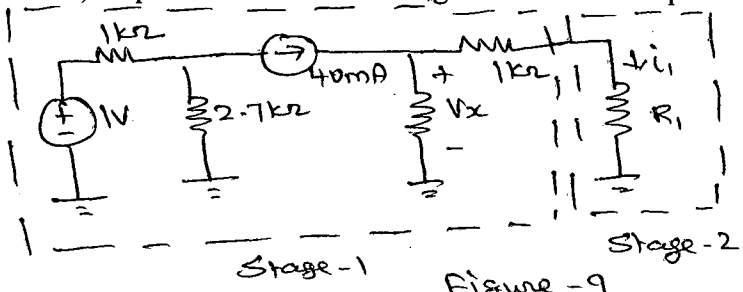
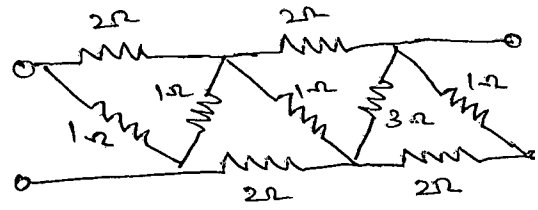



Figure-9




13)a)i) In the circuit shown in Figure-11, calculate the average power generated by each source and the average power delivered to each impedance. (8)

ii) Two admittances, $Y_1=3+j4$ mS and $Y_2=5+j2$mS, are in parallel, and a third admittance, $Y_3=2-j4$mS is in series with the parallel combination, If a current $I1=0.1\angle 30^{\circ}$A is flowing through $Y_1$, find the magnitude of the voltage across (a)$Y_1$, (b) $Y_2$, (c) $Y_3$ (d) the entire network. (8)

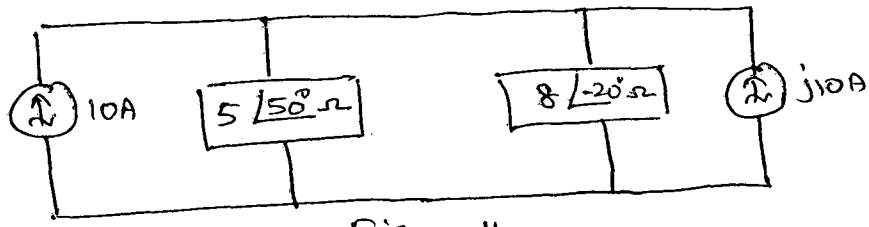



Figure-11

**(OR)**

b) Use superposition to find $v_1(t)$ and $v_2(t)$ in the circuit of Figure-12. (16)

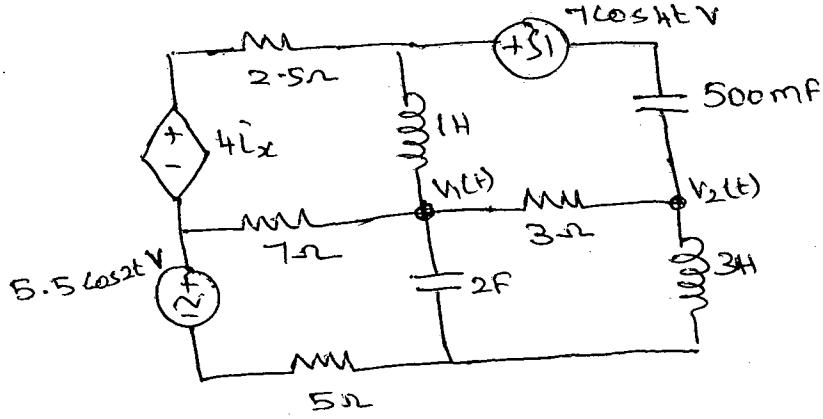



Figure-12

14)a)i)For the circuit in Figure-13, find $i_x$, $i_y$ and power absorbed by 3Ω resistor. (8)

ii) For the circuit of Figure-14, compute the voltage across each current source. (8)

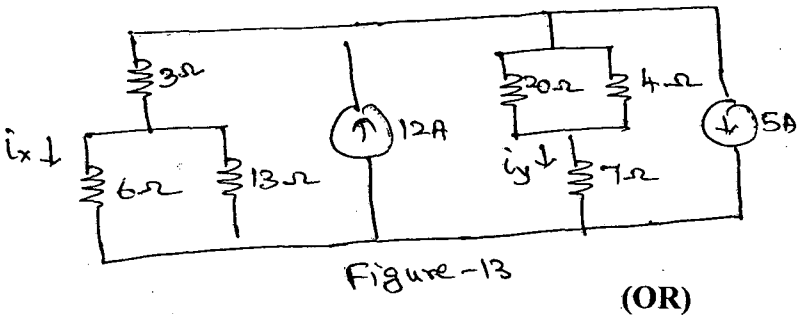
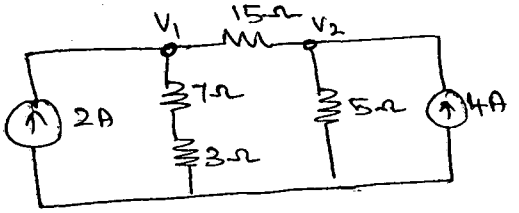



Figure-13




**(OR)**

b)i) Determine the current $i_1$ in the circuit of Figure-15. (8)

ii) Use Ohm's and Kirchhoff's law on the circuit of Figure-16, to find (a) vx, (b)i (c) Is and (d) power provided by the dependent source. (8)

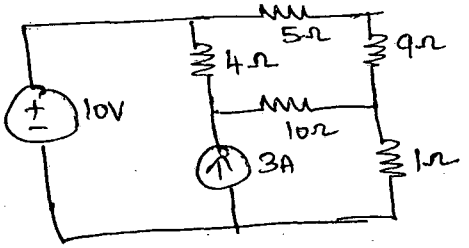



Figure-15

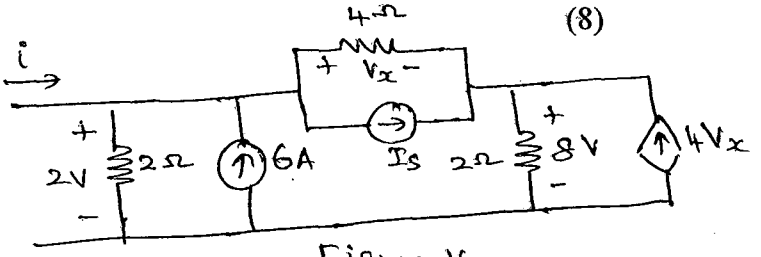



Figure-16

15)a)i) For the circuit of Figure-17, find vc(t) at t equal to (a) $0^-$ (b)$0^+$ (c)∞ (d)0.08s. (8)

ii) A series resonant network consists of a 50Ω resistor, a 4mH inductor, and a 0.1μF capacitor. Calculate values for (a)ωo (b) fo (c) bandwidth (d)Q-factor. (8)

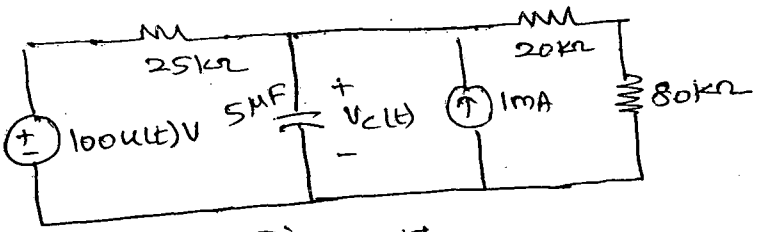



Figure-17

**(OR)**

b)i) The switch of Figure-18 has been open for a long time before it closes at t=0. For the time interval $-5< t < 5\mu s$ sketch (a)$i_L(t)$ (b) $i_x(t)$. (8)

ii)The switch in the circuit shown in Figure-19 has been closed for a very long time. It opens at t=0. Find vc(t) for t>0. (8)

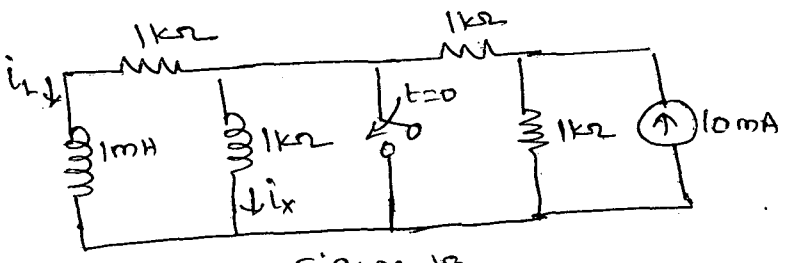



Figure-18

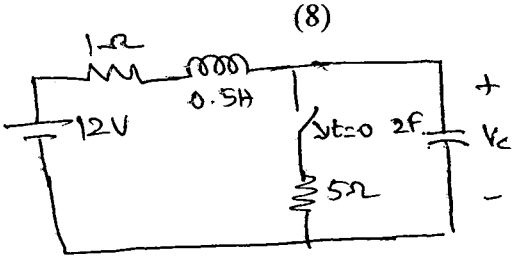



Figure-19